CONSTRUCTION QUALITY ASSURANCE AND PERFORMANCE STANDARD VERIFICATION PLAN

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1.0 INTRODUCTION

1.1 PURPOSE AND ORGANIZATION OF REPORT

This Construction Quality Assurance (CQA) and Performance Standard Verification (PSV) Plan, herein denoted as CQAP, has been developed as required by Section III, Paragraph 3.6 of the Statement of Work (SOW) for Remedial Design and Remedial Action (RD/RA) included as the Attachment B to the Himco Consent Decree (CD), and presents the CQA and the PSV program to be implemented during the municipal water main extension construction activities at the Himco Site (Site) in Elkhart, Indiana. The CQAP has been prepared to ensure that the RD elements are constructed to meet or exceed all design criteria, plans, and specifications.

The CQAP is organized as follows:

i) Section 1.0 presents the purpose and organization of the report, and background information;

ii) Section 2.0 provides Site background and setting information;

iii) Section 3.0 provides a description of the project;

iv) Section 4.0 outlines the project organization and responsibilities;

v) Section 5.0 presents the personnel qualification requirements;

vi) Section 6.0 presents the project meeting requirements;

vii) Section 7.0 describes the inspection and testing activities required to ensure that construction and materials comply with all design specifications and plans; and

viii) Section 8.0 describes documentation requirements of CQA activities.

Final construction specifications and drawings for the water main extension are presented in the Final (100%) Design Submittal.

2.0 SITE BACKGROUND AND SETTING

2.1 SITE DESCRIPTION

The Site is a closed, unlicensed landfill located at the intersection of County Road 10 and the John Weaver Parkway (formerly Nappanee Street Extension) in Cleveland Township, Elkhart County, Indiana. The Site location is shown on Figure 1. According to the Amended Record of Decision (ROD), the Site is approximately 60 acres in size, and was closed in 1976.

The waste on Site is in contact with the water table. The Remedial Investigation/Feasibility Study (RI/FS) (SEC Donahue, 1996) states that residents near the Site reported complaints of color, taste, and odor problems in shallow water supply wells as early as 1974.

Groundwater on Site flows southeast in three water-bearing units. The predominant hydraulic gradient is downwards according to the Supplemental Site Investigation/Site Characterization Report (United State Environmental Protection Agency (USEPA), December 2002) (SSI/SCR), but may in fact be upwards, as observed regionally. Historic groundwater samples collected from the Site contained general chemistry parameters (such as sodium), low part-per-billion concentrations of VOCs, and sporadic detections of metals. The USEPA sampled 21 residential wells in 2000 and found the presence of low concentrations of VOCs and concentrations of metals that exceeded screening criteria.

To date, including during post-RI sampling, only low-level groundwater contamination has been detected off Site. The RI concluded that the greatest potential for contaminant migration from the Site is through the groundwater pathway. The exposure pathways identified by the baseline risk assessment completed for the Site include ingestion of contaminated groundwater, incidental ingestion of contaminated soil, and inhalation of VOCs in groundwater and soil gas.

2.2 SITE SETTING

The Site is bordered to the north by a quarry pond and agricultural land; to the east by the John Weaver Parkway (formerly Nappanee Street Extension), and beyond by residential properties; to the south by residential properties and County Road 10; and to the west by undeveloped land and agricultural properties. The Site is currently fenced.

3.0 PROJECT DESCRIPTION

As presented in the Remedial Design Work Plan Residential Well Abandonment and Municipal Water Supply Report (Water Supply Work Plan), the remedial action is broken down into a phases approach. In order to expedite the municipal water connections portion of the work, and the associated abandonment of private supply wells, the water main extension portion of the RD is separated to allow faster implementation, thereby addressing residents' concerns about the existing water supply. A layout of the water main extension is provided on Figure 2.

The major components of the water main extension activities to be implemented at the Site are as follows:

i) construction of a water main extension;

ii) construction of water service laterals to the property line of 39 residential properties;

iii) commissioning of the water main extension;

iv) extension of service laterals from the property line into individual homes;

v) connection of new municipal service to existing house plumbing, including removal of existing well pump and pressure tank system; and

vi) water supply abandonment of 46 properties.

Details and sequencing of the Water Supply Work Plan are to be implemented at the Site, as required by the CD.

4.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

USEPA Region 5 and the Indiana Department of Environmental Management (IDEM) are designated as the lead and support agencies, respectively, for overseeing the implementation of the requirements of the RD/RA activities at the Site.

Performing Settling Defendants (PSDs), collectively known as the Himco Site Trust, is the party as defined in the CD that is responsible for the implementation of the RD/RA at the Site. The Himco Site is managed by Bayer HealthCare, LLC.

Conestoga-Rovers & Associates (CRA) has been retained by the Himco Site Trust to complete RD/RA activities at the Site, as required by Section VI, Paragraph 11 of the CD. As the Engineering Consultant, CRA will be responsible for implementing the RD/RA activities at the Site, and will report directly to the Himco Site Trust.

Himco Site Trust will publicly tender the water main extension construction and will retain a General Contractor for the water main extension activities. The General Contractor will retain additional contractors and subcontractors as necessary to complete the water main extension activities at the Site. CRA will provide construction oversight to ensure that construction meets all design components as specified in the Final Design of the water main extension.

Brief descriptions of the duties of the key personnel are presented below.

4.1 THE HIMCO SITE TRUST PROJECT MANAGERS

This section describes the project organization and responsibilities of the Himco Site Trust project team. The organization structure of the project is described below.

PSDs

The PSDs are represented by the Himco Site Trust. The Himco Site Trust is managed by Bayer HealthCare, LLC. Bayer HealthCare retained CRA as the Engineering Consultant and will retain testing companies for the water main extension.

PSDs' Project Coordinator – Mr. Gary Toczylowski, Bayer HealthCare

The PSDs have identified Mr. Gary Toczylowski of Bayer HealthCare as their Project Coordinator. As Project Coordinator, Mr. Toczylowski has overall responsibility for the implementation of the RD/RA and oversees the work of the Supervising Contractor.

The PSDs have identified Mr. Tom Lenz of Bayer HealthCare as their Alternate Project Coordinator. Responsibilities are the same as shown above as delegated by the Project Coordinator.

4.2 ENGINEERING CONSULTANT- CONESTOGA-ROVERS & ASSOCIATES (CRA)

The PSDs retained CRA to act as Supervising Contractor for the RD/RA. CRA reports to the PSDs' Project Coordinator, Mr. Gary Toczylowski. CRA's work for the RD will include, among other things, preparation of work plans, implementation and oversight of the work, reporting, and design of the remedy. Bayer HealthCare will select the General Contractor for the water main construction. CRA will select testing subcontractors to perform specific tasks such as water main disinfection activities, soil compaction testing, etc. Subcontractors will be subject to approval by the PSDs' Project Coordinator prior to working on the Site.

4.3 ON-SITE FIELD INSPECTOR

The on-Site Field Inspector will be appointed by the Engineering Consultant, CRA. The individual will be identified upon finalizing the construction schedule. The duties of the on-Site Field Inspector are generally as follows:

i) provides day-to-day construction inspection;

ii) provides technical guidance to contractors and sub-contractors;

iii) provides technical representation at meetings as appropriate;

iv) coordinates testing firms to perform quality assurance field/laboratory tests;

v) reviews reports including daily summary reports;

vi) reports to the Engineering Consultant's Project Manager;

vii) provides review of General Contractor's on-Site project activities;

viii) serves as the CQA Officer (CQAO);

ix) provides field management of CQA activities;

x) in conjunction with the Design Engineer, reviews design criteria, plans and specifications, submittals and shop drawings for clarity and completeness so that the CQAP can be implemented;

xi) coordinates technical submission and shop drawing review with the Design Engineer if necessary;

xii) coordinates design modification and technical memoranda review with the Design Engineer if necessary;

xiii) informs CQA support personnel of CQA requirements and procedures;

xiv) ensures that all Site activities are recorded and are reported as required;

xv) ensures that CQA test results and observations are accurately recorded and interpreted in the CQA Inspection Log Book;

xvi) identifies work that should be accepted, rejected, or uncovered for observation, or that may require special testing, inspection, or approval;

xvii) rejects defective work and verifies that corrective measures are implemented;

xviii) interacts daily with the Contractor to provide assistance in modifying the materials and work to comply with the specified design;

xix) records meeting discussions and prepares and submits meeting minutes;

xx) ensures that the Health and Safe Plan (HASP) is implemented on the construction site and conducts daily meetings to discuss health and safety issues; and

xxi) prepares reports and documentation described in Section 8.0.

4.4 CQA SUPPORT PERSONNEL

The CQA Support Personnel will be appointed by the Engineering Consultant, CRA. The individual will be identified upon finalizing the construction schedule. The duties of CQA Support Personnel are as follows:

i) prepares daily summary reports for on-Site Field Inspector;

ii) reports directly to the on-Site Field Inspector;

iii) reviews CQA documentation and construction and testing activities to ensure the water main construction activities are being conducted in accordance with the specifications, and completes inspection data sheets;

iv) conducts CQA tests and inspections as indicated in this CQAP to confirm construction and material quality are as specified;

v) accurately records test results and inspections in the CQA Inspection Log Book;

vi) immediately notifies the on-Site Field Inspector whether or not test results comply with design specifications and documents situation; and

vii) prepares design acceptance reports and final documentation of all records for final storage.

4.5 GENERAL CONTRACTOR

The duties of the General Contractor, as they relate to Quality Assurance/Quality Control (QA/QC), are as follows:

i) complies with the requirements of qualified testing firms (laboratory, geotechnical, etc.), for Construction Quality Control (CQC) testing of materials and workmanship to ensure that construction materials and methods meet specified requirements as defined in the construction specifications;

ii) submits samples and/or materials for testing to determine if samples/materials meet specified requirements as defined in the construction specifications;

iii) carries out construction activities according to design specifications, construction drawings and reviewed shop drawings;

iv) implements the CQC requirements specified in the construction specifications;

v) provides quality materials and workmanship to ensure that materials and methods meet the specified requirements;

vi) submits to the on-Site Field Inspector required submittals including CQC reports, updated schedules, fabrication reports, etc.; and

vii) prepares and submits shop drawings, submittals, obtains construction permits and inspection requests as required by the Engineering Consultant.

5.0 PERSONNEL QUALIFICATIONS

5.1 ON-SITE FIELD INSPECTOR

The on-Site Field Inspector will have the following qualifications:

i) minimum 2 to 5 years experience in the oversight and inspection of water main construction;

ii) good management, communication and record keeping skills;

iii) able to survey final placement of material to confirm acceptability, and for record drawing purposes;

iv) able to understand the results of CQA tests and determine any required action; and

v) able to comment on General Contractors' procedures with regard to construction safety.

5.2 CQA SUPPORT PERSONNEL

The CQA Support Personnel will have the following minimum qualifications:

i) degree from a recognized college in engineering technology, or equivalent; or a minimum of 2 years experience in construction and their particular specialty of CQA inspection and testing procedures; and

ii) working knowledge of relevant codes and regulations in their specialty concerning material and equipment installation, observation and testing procedures, documentation procedures, and site safety.

5.3 GENERAL CONTRACTOR

The selected General Contractor will assign experienced personnel to supervise the installation of the water main and services. In particular, the selected contractor will assign experienced personnel to the following critical activities:

i) construction of the water main extension;

ii) disinfection and commissioning of the new water main prior to final connections; and

iii) alteration of plumbing in private homes.

Experienced personnel will have a working knowledge of testing procedures and equipment requiring confirmation of compliance to the design requirements.

The General Contractor will designate an on-Site Project Superintendent empowered to act on behalf of the General Contractor in all matters pertaining to the water main extension activities.

6.0 PROJECT MEETINGS

Project meetings as detailed herein will be held during the water main extension construction period to ensure that all tasks are accomplished according to schedule and that they are completed in accordance with the water main extension plans and specifications. These progress meetings may be attended, as necessary, by the Contractors' Project Managers, on-Site Field Inspector, CQA Support Personnel as necessary, City of Elkhart representative, Design Engineer, General Contractor Representative(s), and USEPA and/or IDEM.

The on-Site Field Inspector will take minutes for all meetings held on Site during the construction. Copies of the minutes will be forwarded to the Himco Site Trust and all organizations present at the meetings.

6.1 PRECONSTRUCTION MEETING

The Himco Site Trust will conduct a preconstruction meeting with the Engineering Consultant, General Contractor and City of Elkhart to address the topics listed below. The preconstruction meeting will be documented by a designated person and the meeting minutes will be distributed to all parties.

Purpose: To introduce all parties involved in the water main extension activities, resolve any uncertainties in the water main extension drawings and specifications, review levels of responsibility, reporting requirements, Site health and safety requirements, and to discuss the project sequencing and anticipated difficulties.

Topics:

i) introduce each organization and identify Site personnel;

ii) review general scope of work, schedule, municipal permits and requirements of the contractor as outlined in Section 4.5 of this CQAP;

iii) present CQAP, General Contractor's Site-specific HASP, and other relevant documents;

iv) review the activities to be conducted by the General Contractor;

v) review roles of each organization relative to the design criteria, plans and specifications, schedule, and the CQAP;

vi) determine any need to modify the CQAP that may be necessary to ensure that the construction is performed to meet or exceed the specified design criteria;

vii) review lines of authority and communication;

viii) discuss the established procedures or protocols for observations and tests including sampling strategies;

ix) discuss the established procedures or protocols for handling construction deficiencies, repairs and retesting;

x) review methods for documenting and reporting inspection data;

xi) review methods for distributing and storing documents and reports;

xii) review work area delineation, security and safety protocols;

xiii) discuss the location for storing construction equipment and materials;

xiv) discuss the protection of uncompleted construction work during off-hours and during inclement weather;

xv) conduct a Site tour to review construction areas, safety areas maintained by the General Contractor and equipment and stockpile storage locations;

xvi) take photographs of area for 'before construction' conditions;

xvii) identify procedures to resolve disputes or misunderstandings during construction;

xviii) review of emergency plans and contingency plans;

xix) review of endpoint activities and procedures for project completion; and

xx) review of communication procedure for inquiries by public and press.

6.2 BI-WEEKLY PROGRESS MEETINGS

The On-Site Field Inspector shall conduct a bi-weekly progress meeting with the General Contractor to address the topics listed below. The bi-weekly progress meetings shall be documented by a designated person and minutes distributed to the Himco Site Trust, municipality, USEPA and/or IDEM.

Purpose: To provide a water main extension progress update to Himco Site Trust, the municipality, USEPA and/or IDEM.

Topics:

i) review previous meeting minutes;

ii) present General Contractor's Health and Safety report for previous week's activities;

iii) review the work activities from the previous week;

iv) present comparison of actual progress to scheduled work activities, noting of schedule slippages and actions implemented to rectify;

v) summarize work activities scheduled for the next week;

vi) review potential remedial construction problems/conflicts for the next 2 week's remedial construction activities, and review proposed solutions;

vii) identify and discuss any environmental issues that may have or be expected to arise;

viii) identify and discuss any extra work items that may be foreseen;

ix) discuss any technical issues arising out of progress of the work;

x) identify any required submissions to be made;

xi) review construction quantities to date;

xii) discuss any new business; and

xiii) set a date and time for the next meeting.

6.3 PERIODIC MEETINGS

The On-Site Field Inspector shall conduct periodic meetings with the General Contractor if necessary. This is intended to be an informal meeting held on an as-needed basis. The periodic meetings shall be documented by a designated person and minutes distributed to the Himco Site Trust, municipality, USEPA and/or IDEM.

Purpose: To review work schedule progress and if a problem or deficiency is present or likely to occur. Items to be presented to Himco Site Trust, the municipality, USEPA and/or IDEM.

Topics: To be determined prior to each periodic meeting.

7.0 INSPECTION AND TESTING ACTIVITIES

7.1 SCOPE

Throughout the water main construction activities there will be numerous inspection and testing requirements for specific work tasks. The inspection and testing requirements will ensure compliance with the design as presented in the construction specifications and to ensure completion of the work tasks to the highest level of quality.

Inspections and testing will provide a qualitative means of monitoring the quality and progress of work performed.

The components of each work task that may require some form of inspection or testing are as follows:

i) Water Main Installations:
   a) alignment and level;
   b) excavation and shoring;
   c) traffic control;
   d) joint restraint and pipe wrapping installation;
   e) pressure and leak testing;
   f) valve and fitting installation;
   g) bedding and backfilling;
   h) pavement restoration; and
   i) landscaping restoration.

ii) Site Preparation:
   a) erosion and sediment control; and
   b) control of surface water.

iii) Cast-in-Place Concrete Work:
   a) curbs, gutter, and sidewalks;
   b) shoring, and bracing; and
   c) placement and curing of concrete.

iv) Paving Activities:
   a) level and thickness control; and
   b) compaction.

v) Landscaping:

a) topsoiling;

b) seeding;

c) fertilizing;

d) watering;

e) tree and shrub replacements; and

f) fence replacement.

7.2 INSPECTIONS

Throughout the period of water main extension the quality of work completed and material used for each work task will be maintained at its highest possible level through regular inspections of the work. The on-Site Field Construction Manager and CQA support personnel will complete inspections on a periodic basis throughout the construction activities, as required.

In general, inspections to be conducted by the on-Site Field Inspector and CQA support personnel include the following:

i) daily inspections of the work progress;

ii) maintain a photograph record of work;

iii) inspections of material as it is delivered to the Site to check for damage during delivery;

iv) comparison of the material delivered to the design specifications;

v) inspection of materials after they have been installed to ensure that they have not been damaged during installation;

vi) a pre-construction inspection will be performed prior to beginning work on any work task. A pre-construction inspection will include the following:

a) a review of contract requirements to ensure that all materials and/or equipment have been tested according to applicable standards and specifications;

b) ensure that provisions have been made to provide required quality control testing; and

c) examination of the work area to ascertain that all applicable preliminary work tasks have been completed;

vii) General inspections will be performed periodically as the amount of work completed warrants an inspection. A general inspection will include the following:

a) examination of the quality of workmanship;

b) testing of materials for compliance with Contract requirements;

c) any omissions;

d) general progress of work performed; and

e) measurement of final location for record and payment purposes;

viii) A final inspection will be performed upon completion of each work task to ensure compliance with the construction drawings and specifications and to ensure that deficiencies identified in the general inspections have been corrected; and

ix) Pre-final inspection with USEPA as described in Section 8.7 of this CQAP.

These inspections will be performed by the on-Site Field Inspector, and the results of the inspections will be recorded in the Log Book, and will be summarized in the Final Remedial Action Report. Results of the pre-construction, general, and final inspections will be provided to all parties in the contract.

The components of each work task to be inspected, the types of inspections required and the frequency of the inspections are summarized in Table 1.

7.3 TESTING

In addition to the daily CQA inspections of the construction activities, CQA material testing will be performed as required. CQA material testing will be performed to ensure compliance with material specifications and design criteria as presented in the construction specifications.

The CQA testing requirements, methods of testing, testing frequency, key acceptance criteria, and potential corrective measures for each of the work task components are summarized in the Construction Specifications. The CQA inspection requirements are summarized in Table 1. In general, the CQA testing requirement is to conduct a frequency of testing of about 10 percent of the CQA testing requirements.

If a particular test for a material or work activity continually or frequently fails, the on-Site Field Inspector may increase the rate of CQA testing as determined appropriate for the material/activity that fails.

CQC testing will be performed by the General Contractor to measure and control the characteristics of the materials and installation procedures used in order to demonstrate that the materials and installations meet the requirements of the construction specifications. The minimum requirements for CQC testing are specified in the construction specifications.

8.0 CQA DOCUMENTATION

8.1 GENERAL

This section details the documentation requirements for the CQAP. The proper, thorough, and accurate documentation of all construction and CQA site activities is important in ensuring quality installation.

8.2 CONSTRUCTION INSPECTION SITE LOG BOOK

The on-Site Field Construction Manager will record quality control activities in a Site Log Book to be kept on Site at all times. The Log Book will generally include the following information as appropriate to the work activities:

i) date and weather conditions;

ii) daily report that documents Site activities;

iii) decisions made regarding approval of units of material or of work, and/or corrective actions to be taken in cases of substandard quality;

iv) submittals made by suppliers verifying material quality;

v) quality control test and inspection results;

vi) construction delays and causes;

vii) areas affected by delays;

viii) construction problems and corrective actions;

ix) personnel on Site;

x) present phase of construction;

xi) list of material and/or equipment including date of delivery to site (including equipment demobilization);

xii) inspections made;

xiii) quality control tests performed and results of tests taken on previous workday and verification of agreement with design specifications;

xiv) changed conditions/conflicts encountered;

xv) visitors to the Site; and

xvi) remarks.

8.3 CQA INSTRUMENT CALIBRATION

The CQA Support Personnel will record calibrations of test equipment performed by the General Contractor in the CQA Log Book maintained on Site, if calibration is required. Actions taken as a result of recalibration will be recorded in the CQA Log Book.

8.4 CQA INSPECTION LOG BOOK

All CQA observations and tests results will be recorded by the CQA Support Personnel in the Log Book. The Log Book will be kept on Site and maintained by the on-Site Field Inspector.

8.5 PROBLEM/CORRECTIVE ACTIONS

A problem is defined as material or workmanship of a significant nature that does not meet the construction specifications or drawings. Documentation of a problem/corrective action may include the following information:

i) description of the problem;

ii) probable cause;

iii) when the problem was identified;

iv) estimated extents of problem;

v) suggested corrective action;

vi) documentation of correction; and

vii) final results.

In some cases, not all of the above information will be available or obtainable. However, when available, such efforts to document problems could help to avoid similar problems in the future

Problems and Corrective actions will be addressed as outlined in the project Construction Specifications.

8.6 PRE-FINAL CONSTRUCTION INSPECTION

In accordance with Part III Section 4.2. of the SOW, Himco Site Trust will notify the USEPA for the purpose of conducting a pre-final inspection within 30 days after the Himco Site Trust makes a preliminary determination that the construction will be complete. The purpose of the inspection is to determine if the project is complete and consistent with the contract documents and the Remedial Action. The pre-final inspection will consist of:

i) a walk- through inspection of the water main route with USEPA, IDEM, and the General Contractor; and

ii) identification of any outstanding construction items during the inspection.

8.7 PRE-FINAL INSPECTION REPORT

In accordance with Part III Paragraph 4.3. of the SOW, Himco Site Trust will submit a Pre-Final Inspection Report consisting of:

i) an outline of any outstanding construction items and document corrective actions required to resolve the items;

ii) establish a completion date for the documented corrective actions; and

iii) provide a proposed date for the final inspection.

8.8 FINAL INSPECTION

In accordance with Part III Section 4.4. of the SOW, Himco Site Trust will notify USEPA and IDEM within 30 days after the completion of any work identified in the pre-final inspection report for the purpose of conducting a final inspection. The final construction inspection will consist of:

i) a walk-through inspection of the water main route by USEPA, IDEM, and the Himco Site Trust;

ii) the pre-final inspection report will be utilized as a checklist, with the final inspection focusing on the outstanding construction items identified in the pre-final inspection; and

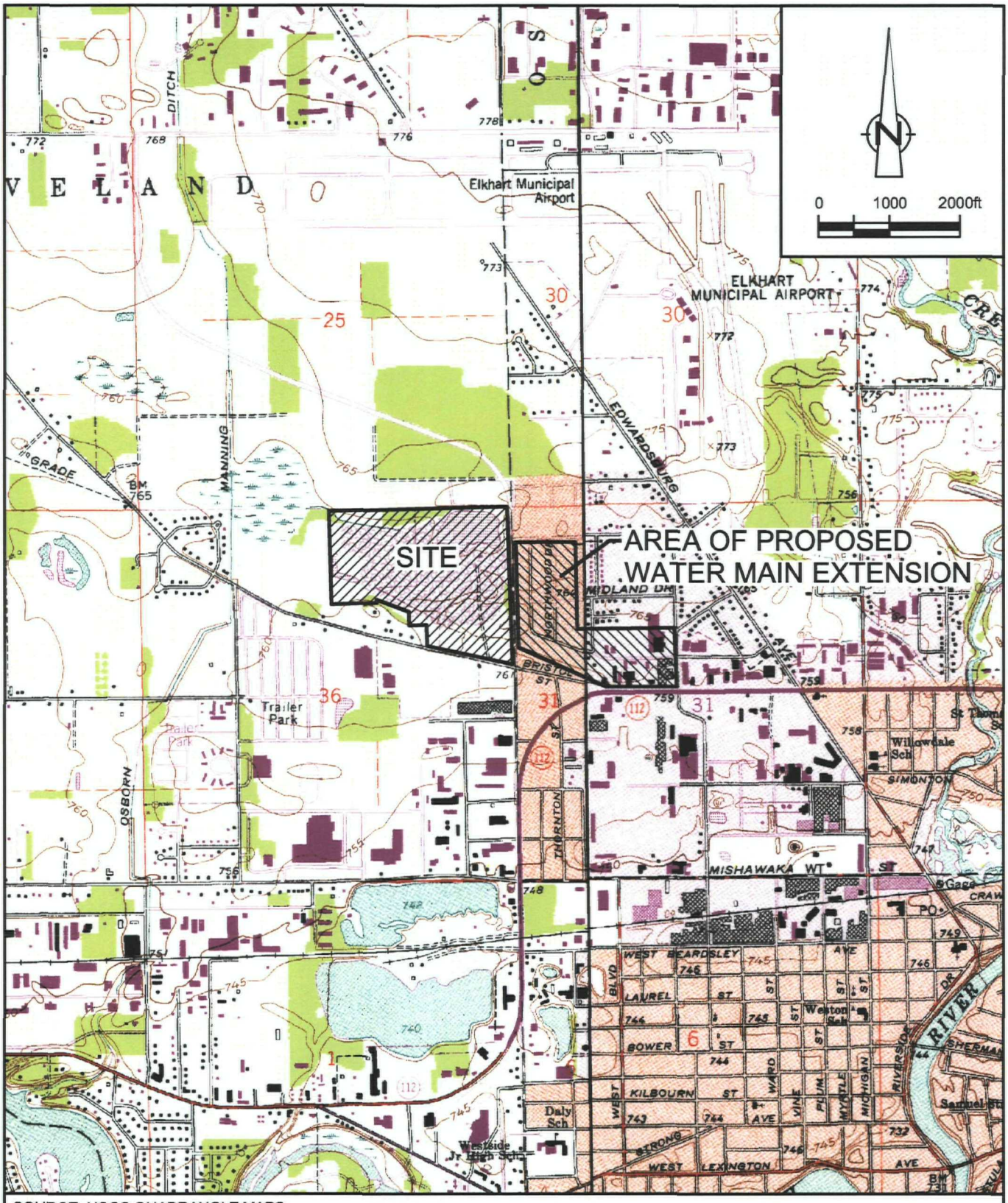
iii) outstanding items will be confirmed to be resolved.

8.9 CONSTRUCTION COMPLETION REPORT

In accordance with Part III Paragraph 4.4. of the SOW, the Himco Site Trust shall notify the USEPA and IDEM within 30 days of construction completion to arrange a final inspection of the work. Items addressed in the pre-final inspection report will be used as a point of comparison to ensure outstanding construction items were completed and/or resolved.

8.10 STORAGE OF RECORDS

During water main extension construction activities, the On-Site Field Inspector will maintain a copy of the construction drawings and specifications, CQAP, and CQAP documentation, photos, material delivery sheets, survey records, meeting minutes, test results and technical documentation in the Site office. Once the construction is complete, the Engineering Consultant or the Himco Site Trust will retain all CQA documents (originals) in accordance with Section XXV Retention of Records as described in the CD.



SOURCE: USGS QUADRANGLE MAPS;
ELKHART AND OSCEOLA, INDIANA

figure 1

SITE LOCATION MAP AND AREA OF PROPOSED WATER MAIN EXTENSION HIMCO SITE

Elkhart, Indiana

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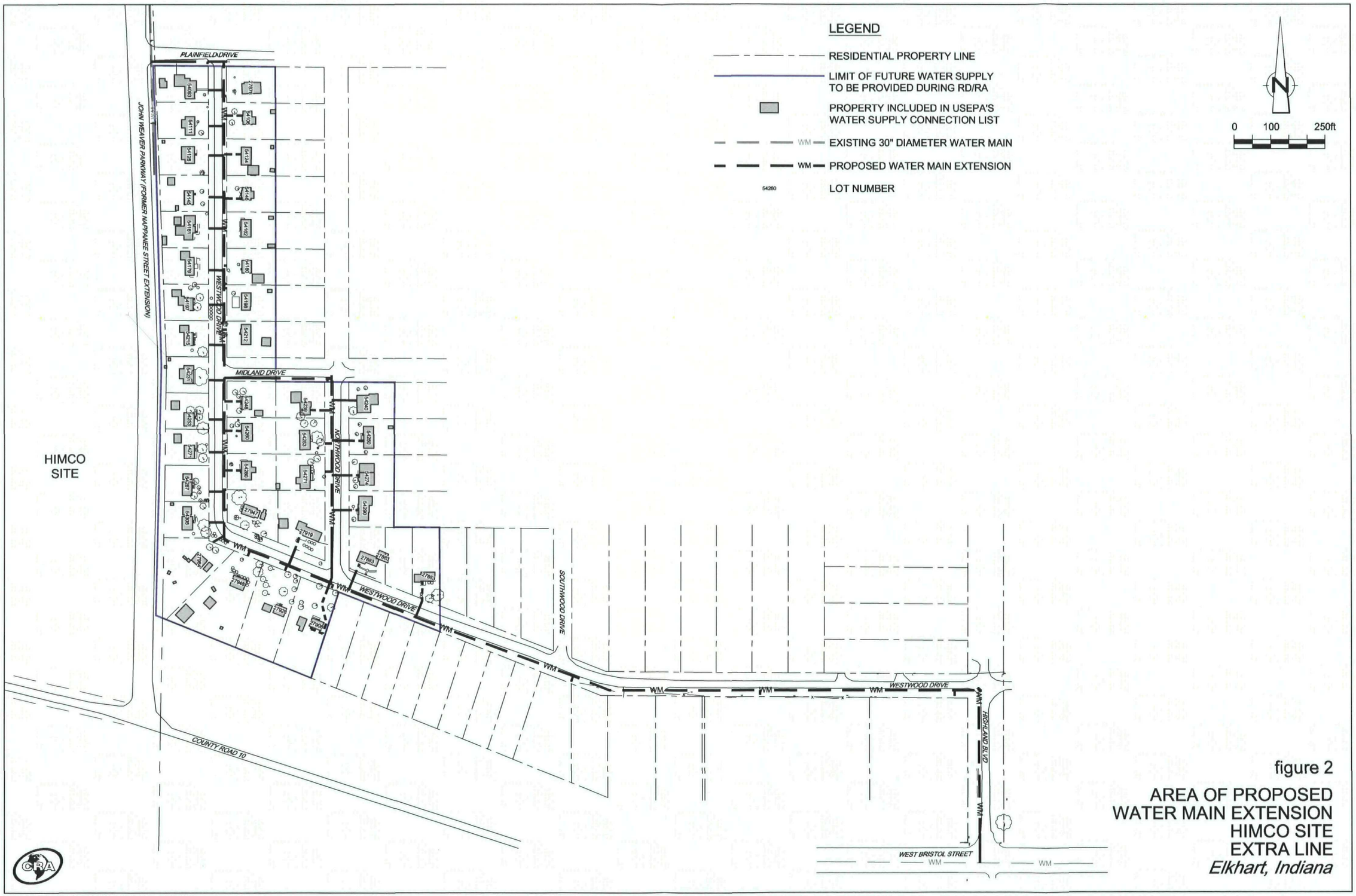

figure 2

AREA OF PROPOSED
WATER MAIN EXTENSION
HIMCO SITE
EXTRA LINE
Elkhart, Indiana

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TABLE 1

CONSTRUCTION QUALITY ASSURANCE INSPECTION REQUIREMENTS
WATER MAIN EXTENSION
HIMCO SITE
ELKHART, INDIANA

Key Components for Inspection	*Key Items to be Checked During Inspection*	*Type of Inspection*	*Frequency of Inspection*	*Submittals & Records*
A. SITE PREPARATION				
Granular	Does granular materials meet specifications?	Visual Review gradation analysis	Each type & source Upon placement	Gradation analyses
	Has gravel been placed as specified?	Visual	Periodic during installation	Notes in daily records
Temporary Construction Facilities	Have temporary construction facilities been provided as specified?	Check Specification Visual	Periodic during installation	Notes in daily records and photographs
Location of Existing Utilities	Have all utilities been located and marked appropriately?	Visual	Prior to excavation	Notes and Photographs
Traffic Control / Barricades	Are all temporary traffic controls in place as specified?	Visual	Periodic during construction	Notes and Photographs
B. WATER MAIN				
Pipe	Does pipe meet specifications?	Check Specification Check pipe markings	Each source of pipe Upon delivery to site	Bill of Coding Test reports
	Has pipe been installed as specified? (grade, depth below ground surface, thrust constraints, bonding straps, bedding)	Visual Survey	Periodic during installation	Field book notes, record drawings and photographs
Gravel Bedding	Does gravel meet specifications?	Check Specification Review Gradation analysis	Each source of gravel	Gradation analyses
	Has gravel been placed as specified?	Visual	Periodic during installation	Notes in daily reports
Leakage	Amount of Leakage	Pressure and Leak Test	Prior to final connection	Notes in daily reports
Disinfection	Chlorination Disinfection	Chlorine Tests Water samples	Prior to final connections Prior to final connections	Notes in daily reports Test Results

TABLE 1

CONSTRUCTION QUALITY ASSURANCE INSPECTION REQUIREMENTS
WATER MAIN EXTENSION
HIMCO SITE
ELKHART, INDIANA

Key Components for Inspection	*Key Items to be Checked During Inspection*	*Type of Inspection*	*Frequency of Inspection*	*Submittals & Records*
C. MATERIALS				
Concrete	Concrete mixes conform to design specifications	Verify supplier's design mix	Prior to delivery to site	Mix Design
	Time from the mixture of concrete batch to placement of concrete	Visual	Per truckload	None
	Concrete cylinders	Samples	Every 100 cubic yard	Test Reports
	Concrete thickness and grade meet design specification	Visual Survey	Prior to concrete placing	Field book notes
Native Soil Backfill	Does soil contain unsuitable material?	Visual	During backfilling	Notes in daily record
	Layer thickness	Visual	During backfilling	Notes in daily record
	Compaction	Field Test	First 2 days Check every 3 days When soil conditions change	Test results
Asphalt	Mix	Reviewed by Geotechnical Professional	Prior to paving	Test Reports
	Temperature and Thickness	Measurement	During placement	Notes in daily report
	Gradation, voids, asphalt cement content	Samples, analysis	First 100 ton	Test Reports
	Marshall Stability	Samples, analysis	Over 300 tons then every 500 ton	Test Reports
D. TRAFFIC CONTROL				
	Compliance with City and State regulations	Review Contractor's plan	Prior to construction	Copy to file
	Compliance with Traffic Control Plan	Visual	Daily	Notes and Photographs